A 4 MPC X-RAY FILAMENT FALLING INTO THE CLUSTER A85

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We have completed a first paper confirming the ROSAT observation of a merging filamentary structure associated with the rich cluster A85 (see Durret, F.; Lima Neto, G. B.; Forman, W.; Churazov, E. Astronomy and Astrophysics, v.403, p.L29-L32 2003). We detected a portion of the extended 4 Mpc filament first seen by the ROSAT PSPC. We confirm that there is an extended feature, aligned at the same position angle as the major axis of the central cD, the bright cluster galaxies, and nearby groups and clusters. We find that the X-ray emission from the filament is best described by thermal emission with a temperature of ~2 keV, which is significantly lower than the ambient cluster medium, but is significantly higher than anticipated for a gas in a weakly bound extended filament. It is not clear whether this is a filament of diffuse emission, a chain of several groups of galaxies, or stripped gas from the infalling south blob.

In conclusion, the XMM-Newton observations confirmed that there really is a highly elongated filamentary like structure extending from the the merging south clump to the south east of Abell~85 along the direction defined by all the structures pointed out by Durret et al. (1998b). The fact that the spatial structure of the X-ray filament detected by XMM-Newton cannot be exactly superimposed to that obtained from ROSAT data shows that it is still difficult to determine exactly its nature.

However, the X-ray spectrum from this structure is most likely thermal and its temperature is about 2.0 keV, consistent with that of groups. This value is notably cooler than that of the main cluster: the temperature map by Markevitch et al. (1998) shows the presence of gas at about 3-4 keV in the region at a distance from the cluster center at least as far as the northern part of the ellipse. So, we appear to be seeing cool gas as it enters the cluster core.

Another possibility is that the filament is associated with the wake of cool stripped gas left behind by the south blob as it falls onto the cluster. In this case, the ``filament'', whether it is diffuse or made of groups, would not really be a filament in the large scale structure formation sense. Besides X-ray observations with a much better signal to noise ratio, which probably will have to wait for the next generation of X-ray satellites, optical data can shed light on this question. With this purpose, we intend to perform wide field imaging in various bands to estimate galaxy photometric redshifts and determine how galaxies are distributed in the ``filament'' area.